Annual Report of the Ley Creek Sewage Treatment Plant, Onondaga County, N. Y., for the Year 1953

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Source: *Sewage and Industrial Wastes*, Vol. 27, No. 12 (Dec., 1955), pp. 1418-1420
Published by: Water Environment Federation
Stable URL: http://www.jstor.org/stable/25032957
Accessed: 28-03-2018 14:55 UTC

*Operating Personnel*

In 1954, four new men were placed on the staff and required training. Two men replaced staff losses due to a death and a retirement. An additional operator and a mechanic's helper were necessary through a reduction in the work week from 44 hr. to 40 hr. The operating staff now consists of two mechanics and helpers, five utility men and six operators including a relief operator. Supervision is supplied by an engineer and a chemist.

For the preceding 8 years there had been no turnover of personnel. Each operator is given an opportunity to attend the short school and various operators' meetings on a rotation basis.

Personnel worked the following distribution of hours as listed on top of second column.

| Item | Hours 1953 | 1954 |
|---|---|---|
| Sewers | 1,030 | 1,036 |
| Pumping stations: | | |
| No. 1 | 1,923 | 1,712 |
| No. 2 | 441 | 504 |
| No. 3 | 381 | 384 |
| Chlorination | 147 | 115 |
| Channels and pipe gallery | 81 | 81 |
| Comminutors | 143 | 215 |
| Grit removal | 1,280 | 1,779 |
| Clarifiers | 6,640 | 5,278 |
| Digesters | 3,971 | 4,614 |
| Drying beds | 2,560 | 1,815 |
| Building maintenance | 3,764 | 4,681 |
| Ground maintenance | 1,345 | 1,397 |
| Equipment maintenance | 1,876 | 2,899 |
| Adm. and laboratory | 4,934 | 4,931 |
| Total | 31,955 | 31,559 |
| Vacation | 1,356 | 1,436 |
| Sick Leave | 342 | 446 |

In addition to the work at the treatment plant, the operating staff put in 1,162 hr. in 1953 and 1,698 hr. the following year in outside or off-site work of a maintenance nature for the city.

*Salaries*

Salaries are set by the Finance Committee of the city's council. Wages constitute 65 to 68 per cent of the total operating cost. Due to the inauguration of the 40 hr. week on Jan. 1, 1954 this budgetary item increased from $62,933.83 to $70,956.00. Another benefit increase for employees was the lowering from 20 yr. to 15 yr. the number of years of service necessary to be eligible for three weeks vacation.

Present annual salary scales are:

| | |
|---|---|
| Superintendent | $6,938.04 |
| Chemist | 3,800.49 |
| Mechanic | 4,223.16 |
| Mechanic helper or operator | 3,983.16 |
| Utility man | 3,863.16 |

In addition to two weeks annual vacation, 12 days per year sick leave is received and cumulative to 120 days. Surgical and hospitalization insurance is provided and all personnel are covered by social security.

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## Annual Report of the Ley Creek Sewage Treatment Plant, Onondaga County, N. Y., for the Year 1953 *

By Uhl T. Mann, *Superintendent*

The Ley Creek Sanitary District serves a small section of the city of Syracuse, the village of East Syracuse, several unincorporated communities and several concentrated industrial sites. Resident population of the sanitary district is estimated at 35,000, but the influx of many large industries has resulted in a population equivalent of approximately 100,000.

Originally constructed as a public works project in the period 1935–40, the 4.5 m.g.d. activated sludge plant

* Winner of the Hatfield Award, 1954, Class II for sewage treatment plants serving populations of 10,000 to 100,000.

replaced six small sewage treatment plants. The small volume of flow in Ley Creek requires a high degree of treatment. By 1945, the treatment facilities were badly overloaded, necessitating enlargement to 9 m.g.d. in 1951.

Treatment units consist of screens, grit chambers, pre-aeration tanks, primary settling and aeration units. Separate sludge digestion is followed by sludge drying on either vacuum filters or drying beds. Sludge gas is stored in a 15,000 cu. ft. gas holder and a 40,000 cu. ft. digester. Chlorination of the plant effluent is practiced during the months of May through September.

Present facilities provide pumping capacity for 40 m.g.d., primary treatment for 20 m.g.d. and standard rate activated sludge treatment for 9 m.g.d. Soil conditions at the plant site require the operation of a dewatering system to lower the ground water and eliminate danger of the tanks floating when emptied. Part of this system is used for process water.

**TABLE II.—Summary of 1953 Operating Data, Ley Creek (N. Y.) Sewage Treatment Plant**

| Item | Average |
|---|---|
| Rainfall (in.) | 29.72 |
| Population: | |
| Connected (estimated) | 35,000 |
| Equiv., B.O.D. | 135,000 |
| Equiv., susp. sol. | 81,500 |
| Sewage flow (m.g.d.) | 5.91 |
| Screenings (cu. ft. per m.g.) | 4.2 |
| Grit (cu. ft. per m.g.) | 6.75 |
| pH: | |
| Influent | 7.36 |
| Settled | 7.43 |
| Final effl. | 7.59 |
| Settleable solids: | |
| Influent (ml. per liter) | 10.1 |
| Primary effl. (ml. per liter) | 1.4 |
| Reduction (%) | 87 |
| Suspended solids: | |
| Influent (p.p.m.) | 314 |
| Primary effl. (p.p.m.) | 154 |
| Plain aeration effl. (p.p.m.) | 71 |
| Activated sludge effl. (p.p.m.) | 19 |
| Combined effl. (p.p.m.) | 45 |
| Reduction (%) | 85.5 |
| B.O.D., 5-day: | |
| Influent (p.p.m.) | 459 |
| Primary effl. (p.p.m.) | 310 |
| Plain aeration effl. (p.p.m.) | 166 |
| Activated sludge effl. (p.p.m.) | 24 |
| Combined effl. (p.p.m.) | 112 |
| Reduction (%) | 75.5 |
| Activated sludge data: | |
| Aeration period (hr.) | 7.12 |
| Air consumption (cu. ft. per gal. sewage) | 1.97 |
| Returned sludge (% by volume) | 27.6 |
| Mixed liquor suspended solids (p.p.m.) | 1,862 |
| Sludge index | 103 |
| D.O., aeration tank (p.p.m.) | 2.8 |
| Excess activated sludge (cu. ft. per m.g.) | 2,530 |
| Chlorination: | |
| Days | 137 |
| Lb. per day | 525 |
| Residual (p.p.m.) | 0.59 |
| Raw sludge: | |
| Pumped per day (cu. ft.) | 4,420 |
| pH | 6.11 |
| Dry solids (%) | 4.6 |
| Volatile solids (%) | 72 |
| Digested sludge: | |
| To drying beds (cu. ft. per day) | 3,062 |
| pH | 7.46 |
| Dry solids (%) | 4.4 |
| Volatile solids (%) | 52 |
| Gas production: | |
| Daily average (cu. ft.) | 82,242 |
| Cu. ft. per lb. (dry) volatile solids added | 9 |
| Gas analysis: | |
| $CO_2$ (%) | 33 |
| Power (k.w.h. per day) | 3,264 |
| Outlet stream analyses (p.p.m.): | |
| Upstream ½ mile: | |
| D.O. | 7.6 |
| B.O.D. | 14 |
| Susp. sol. | 24 |
| Downstream ¼ mile: | |
| D.O. | 4.6 |
| B.O.D. | 64 |
| Susp. sol. | 56 |
| Stream flow [1] (c.f.s.) | 26.5 |
| Treatment costs ($): | |
| Plant operation | 174,517.00 |
| Debt retirement | 343,760.00 |
| Per m.g.[2] | 81.00 |
| Per capita [2] | 1.74 |

[1] Includes plant effluent.

[2] Does not include debt retirement.

*Operation*

Construction features of the plant permit operation as two separate units. During 1953, one-half of the plant was operated as a standard rate activated sludge plant while the other half was operated as a plain aeration plant. Each half of the plant received approximately one-half of the flow except when shock loads upset the activated sludge process. At these times the flow was adjusted to permit plain aeration of the larger part of the flow. The combined effluent of the two sections represented a suspended solids reduction of 85.5 per cent and a B.O.D. reduction of 75.5 per cent. Industrial plants produce 60 per cent of the B.O.D. load to the treatment plant.

The population equivalent is 135,000 when based on the B.O.D. load and 81,500 when based on the suspended solids. Daily analyses showed the strongest sewage had a B.O.D. of 800 p.p.m. The aeration units experienced B.O.D. loadings of 57 to 90 lb. per 1,000 cu. ft. of tank capacity. The overload has been calculated at 60 to 100 per cent of design capacity. On many days the primary tanks fail to provide any reduction in the B.O.D. load due to the high percentage of dissolved solids in the sewage.

The activated sludge treatment, however, remained quite constant with little change in solids, air supply, aeration time, sludge wasted or rate of returned sludge.

Reduction in the quantity of screenings (15 per cent) and scum (21 per cent) resulted in better digester operation. Digestion time was reduced, gas production per pound of volatile matter was increased and there was no lost digester capacity due to heavy scum layers. Approximately 1,100,000 cu. ft. of digested sludge was pumped; one-half to drying beds and one-half to lagoons. The vacuum filters were not operated because funds were not provided for the purchase of chemicals. Almost 85 per cent of the digester gas produced was used by the blower gas engines and digester heating system. The present digestion units are overloaded about 17 per cent on the basis of design.

The operation cost increase is attributed entirely to maintenance. As the equipment gets older the need for repairs and replacement increases. The operating staff numbers 27 and is responsible for the treatment plant and sanitary sewers.

The most pressing operation problems are due to industrial wastes and overloaded treatment units. Each year these conditions become more aggravated. It is difficult to control slugs of industrial wastes, although the industries have been most cooperative.

A summary of operating data for 1953 is given in Table II.

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## SCALE MODEL SEWAGE TREATMENT PLANT

A scale model sewage treatment plant that actually operates has aided the citizens of San Diego, Calif. in understanding this vital municipal service. Designed and constructed under the supervision of Eric V. Quartley, Superintendent, Sewage Treatment Division, the model (Figure 1) represents many hours of diligent work by division personnel.

The model is built to a horizontal scale of approximately 1 in. to 10 ft. while the vertical scale is slightly exaggerated to permit the showing of equipment details. Measuring 5 ft. by 8 ft. in plan the unit is mounted on a sturdy table fitted with casters to facilitate moving. A wood frame glass cover protects the model when on display.